

**REMARKS**

Claims 1-40 are pending. Claims 1-10 and 23-29 have been examined and claims 11-22 and 30-40 have been withdrawn as being non-elected.

Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-10 and 23-29 under 35 U.S.C. § 103(a) over *Heinzmann* (J. Heinzmann and A. Zelinsky, "3-D Facial Pose and Gaze Point Estimation using a Robust Real-Time Tracking Paradigm," IEEE Int. Workshop on Automatic Face and Gesture Recognition, pp. 142-147, 1998) in view of *Park* (Park, K. R., et al., "Gaze position detection by computing the three dimensional facial positions and motions," Pattern Recognition, Vol. 35, No. 11, Nov. 2002, pp. 2559-2569). Applicant respectfully submits that claims 1-10 and 23-29 are patentably distinguishable over *Heinzmann* and *Park* for at least the reasons described below.

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious."

M.P.E.P. § 2141(III). A proper *prima facie* case of obviousness requires, *inter alia*, that all claim limitations must be considered when judging the patentability of a claim against the prior art. M.P.E.P. § 2143.03. Claim 1 recites, among other things, a motion estimating means that "applies ... estimates of ... coordinates of [a] predetermined feature point to an observation function using a perspective transformation based on an observation model of [a] monocular camera to calculate estimates of an observation vector of the predetermined feature point."

*Heinzmann* discloses using a perspective transformation for pose estimation of monocular data, and notes that “[t]he perspective transformation precisely models the actual projection of a 3-D scene to the image plane.” *Heinzmann*, at page 144, column 1, paragraph 5. *Heinzmann* does not otherwise teach the use of the perspective transformation, and instead points out that “the required calculations [of perspective transformations] are complex and time consuming and can deliver up to a fourfold ambiguity in the estimate of the pose.” *Id.* The remaining disclosure of *Heinzmann* is tied to the use of affine transformations. The Office Action alleges that *Park* discloses a perspective transformation and Kalman filtering.

In response to the Reply to Office Action previously filed on October 1, 2009, the Office Action asserts that Applicant’s argument against combining *Heinzmann* and *Park* was not persuasive. The Office Action asserts that certain statements “are unsubstantiated and merely conclusory in nature.” Office Action dated January 5, 2010 (“Office Action”) at page 3.

Specifically, the Office Action alleges that “an affine transformation is merely a subset of perspective transformations with a constraint such that parallel lines must remain parallel after the transformation,” and there is therefore “no reason why a perspective transformation cannot be used [in *Heinzmann*] ... instead of an affine transformation.” *Id.* at page 3. The Office Action further alleges that “[t]here is no reason why the use of a perspective transformation (instead of an affine transformation) would cause [an] unsatisfactory gaze-point estimation [in *Heinzmann*].” *Id.* at page 4.

Contrary to the assertions in the Office Action, Applicant respectfully submits that substantiation for Applicant’s arguments regarding *Heinzmann* already exists in the

record before the Office. Applicant discusses *Heinzmann*, for example, at pages 1-2, paragraphs [0002] and [0003] of the originally-filed specification, and provides substantiation for Applicant's arguments set forth in the Reply to Office Action previously filed on October 1, 2009. Applicant previously explained that *Heinzmann's* method "is not to directly filter parameters of the facial pose and gaze, but to filter only the feature points, and it thus fails to perform an optimal estimation of the gaze." Applicant's specification at page 2, lines 6-8. Applicant also previously explained that *Heinzmann's* "estimation depends upon the specific feature points ... and there is a limitation to the estimation of gaze." Applicant's specification at page 2, lines 11-13. Applicant further previously explained that *Heinzmann's* "gaze is estimated using the relative position change between ... feature points ... and this method is premised on the Affine Transformation of the cameral model." Applicant's specification at page 2, lines 13-16. Applicant also previously explained that *Heinzmann's* "method does not hold under the general Perspective Transformation and thus has a restricted range of application." Applicant's specification at page 2, lines 16-18.

A perspective transformation cannot be used in *Heinzmann* instead of an affine transformation because *Heinzmann's* "gaze is estimated using the relative position change between ... feature points ... and this method is premised on the Affine Transformation of the cameral model." See Applicant's specification at page 2, lines 6-18. Using a perspective transformation instead of an affine transformation would cause an unsatisfactory gaze-point estimation in *Heinzmann* because *Heinzmann's* "method does not hold under the general Perspective Transformation." See Applicant's specification at page 2, lines 6-18.

Many of the alleged teachings of *Heinzmann* are tied to affine transformations, and they cannot be combined with the alleged perspective transformations disclosed by *Heinzmann* and *Park*, because *Heinzmann's* "method is premised on the Affine Transformation of the cameral model ... [and] this method does not hold under the general Perspective Transformation." Applicant's specification at page 2, lines 15-18. Moreover, even if such combinations were possible, they would render *Heinzmann* unsatisfactory for its intended purpose because *Heinzmann's* "gaze is estimated using the relative position change between ... feature points ... and this method is premised on the Affine Transformation," *not* a perspective transformation. Applicant's specification at page 2, lines 13-16.

For at least the above-mentioned reasons, *Heinzmann* and *Park*, either alone or in combination, do not disclose or suggest at least a motion estimating means that "applies ... estimates of ... coordinates of [a] predetermined feature point to an observation function using a perspective transformation based on an observation model of [a] monocular camera to calculate estimates of an observation vector of the predetermined feature point," as recited in claim 1, and therefore claim 1 is allowable over *Heinzmann* and *Park*. Claims 2-10 and 23-29 depend from independent claim 1, and are therefore patentable for at least all of the same reasons that independent claim 1 is patentable. Thus, Applicant respectfully requests that the § 103(a) rejection over *Heinzmann* and *Park* be withdrawn.

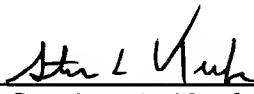
In view of the foregoing remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

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By:   
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Stephen L. Keefe  
Reg. No. 61,100  
(202) 408-4000